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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,755	09/30/2004	Yuichiro Sugita	43890-690	8140

7590 08/09/2006

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EXAMINER

VIJAYAKUMAR, KALLAMBELLA M

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 08/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/509,755

Applicant(s)

SUGITA ET AL.

Examiner

Kallambella Vijayakumar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-29 is/are pending in the application.
- 4a) Of the above claim(s) 2,3 and 17-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-6 and 8-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claims 1, 11 and 12 were amended. Claim 7 was cancelled. Claims 1-6 and 8-29 are currently pending with the application. Claims 2-3 and 17-29 were withdrawn from consideration due to the restriction requirement. Claims 1, 4-6, and 8-16 are currently being prosecuted.

Applicant's arguments filed 05/24/2006 have been fully considered that overcomes the following rejections/objections cited in the last office action:

- 1). Claims 11-12 objected to because of the following informalities.
2. Rejection of claim-4 as obvious over Omoya et al (US 6,139,777).

Claim Objections

Claim 6 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim-6 recites the limitation of "agglomerate has been disaggregated" that will result in primary particles that is broader than the independent claim-1 from which it depends which requires both "primary particles and agglomerate of primary particles" in the composition.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim-1 recites the limitation of "primary particles and agglomerates of primary particles, which are 0.5 to 20 micron in average particle diameter" and it is not clear whether this limitation encompasses diameter of primary particles or agglomerates or both. The examiner construes it to be diameter of primary particles for the purposes of the examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 4, 8-9 and 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Durand et al (US 5,180,523).

Durand et al teach the composition of conductive cement comprising a mixture of two epoxy resins, and an admixture of silver particles with a particle size of 1.27-2,540 microns (0.05 mil-100 mil) and silver agglomerates with an agglomerate size of 2.0-10.6 microns (Abstract, Col-4, Ln 63-65; Col-5, Ln 1-5). A specific example contained: (a). Silver flakes with a mean size of 7 micron, range of <2-14 micron, surface area of 3-0.6 m²/g, tap density of 3.0-3.5 g/cc; (b). Silver agglomerates of with a mean size of **4.5** micron, range of <2-10.6 micron, surface area of 1.62 m²/g; (c). Silver powder with a mean particle size of **1.61** micron, range of <0.51-5.27 micron, surface area of 1.41 m²/g; and (d). epoxy/Bisphenol-F resin (Col-7-8; Example-1, Table). The specific example given in the Table containing 76.5 wt% Ag and 23.5 wt% epoxy translates to: 9.4 cc Ag flake (30.6 g/3.25 g/cc(avg)) + 12.4 cc Ag agglomerate (22.95 g/1.85 g/cc) + 8.5 cc Ag powder (22.95 g/2.7 g/cc)= **30.3 cc of silver** and **20.3 cc epoxy** (23.5 g/1.19 g/cc; See Data for DER 330 and DER 354 Epoxy by Dow Chemical Co, MSDS for 3-glycidoxypopyl-trimethoxysilane by Sigma Chemical and Data sheet Bisphenol F diglycidyl ether by Sigma Aldrich) which calculates to **59.9 vol% Ag** and **40.1 vol%** epoxy that meets the volumetric ratio limitations in instant claim-1.

The degree of agglomeration of the fine Ag conductive particles is 2.8 (4.5 micron/1.61 micron) that meet the limitation of claim-4.

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With regard to claim 8, the claimed % volatile matter in the art paste composition containing Ag particles in bisphenol-F resin will be inherent as evidenced by the disclosure of Kawakita et al (US 5,652,042) that show a volatile content of less than 0.4 wt% for conductive pastes containing silver particles in bisphenol-F type and glycidyl ester type resins (Col-11, Table-2).

With regard to claim-9, the prior art teaches silver particles that are identical to that claimed by the applicants, and identical compositions have identical properties.

With regard to claims 12-13, the prior art teaches a dispersion of silver particles in bisphenol-F diglycidyl ether epoxy (Col-8, Ln 1-41). All the limitations of the instant claims are met.

The reference is anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the

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examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Durand et al (US 5,180,523).

The disclosure on the composition of conductive paste as set forth in rejection-1 under 102(b) is herein incorporated.

The prior art is silent about the shape of the Ag particles used in the composition.

However, the prior art teaches using spheroidal and fine Ag powders. Further, the spherical particles are the most common conductive particles used in the art (See Ferro Technical Data on Ag-Powder 7000-24), and the claimed agglomeration of two primary spherical particles would be obvious.

2. Claims 1 and 5-16 are rejected under 35 U.S.C. 103(a) as being obvious over Omoia et al (US 6,139,777).

Omoia et al teaches the composition of a conductive paste with low viscosity and low volatility for filling the holes comprising 30-70 vol% conductive particles such as copper with an average diameter of 0.5-20 micron and a specific surface area of 0.05-1.5 m²/g and 70-30 vol% resin such as epoxy (Abstract).

The prior art is silent about the agglomerates per claim-1 and disaggregation of agglomerates per claim-6.

With regard to agglomeration in claims 1 and 5, the prior art teaches pastes with a low viscosity of 40 Pa.s for sample-4 in Table-7 (Col-21) containing spherical particles (Fig-5) that are similar to that taught by the applicants. The particles of the prior art are similar to those by the applicants and obviously tend to agglomerate because similar compositions are expected to possess similar properties and characteristics (See the micrographs of Umicore Cu particles used in electrode inks and terminal pastes). Further, two spherical particles forming the agglomerates would be obvious, because agglomeration obviously requires at least two particles, and the particles have a distribution of different particle sizes that meet the

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limitation of two primary particles in the claim (See the micrographs of Umicore Cu particles and data for UCP-500 having a d90 of 2 micron and d50 of 1 micron and Ag-Powder 7000-24 from Ferro).

With regard to claim-6, the prior art further teaches making the conductive paste by mixing the components in a three roll mill, wherein the composition, components and process of making the art composition (Abstract, Col-20, ExampI-5) are similar to that taught by the applicants (Specification: US 2005/0172483; Abstract, Fig-5, Para 0057) and further both the compositions have same utility as hole-filling pastes whereby the disaggregation of agglomerated particles will be obvious.

With regard to claim 8, the prior art paste composition and components used in making the paste are similar to that by the applicants and similar compositions are expected to possess similar properties. This is further substantiated by the disclosure of Kawakita et al (US 5,652,042) that show a volatile content of less than 0.4 wt% for conductive pastes containing silver particles in bisphenol-F type and glycidyl ester type resins (Col-11, Table-2).

With regard to claims 9-10 and 13-16, the prior art teaches conductive particles such as Cu, Ag and Au and their alloys, and particles coated with metals such as Cu, Ag and Au and their alloys, wherein the surface oxygen content is less than 1 wt% (Col-3, Ln 1-19), and with regard to claim-9, the prior art composition is similar to that by the applicants and similar compositions are expected to possess similar properties.

With regard to claims 11-12, the prior art teaches glycidyl ester epoxies including dimer acid glycidyl esters (Col-8, Ln 65 to Col-9, Ln 10; Col-11, Ln 30-36) with amine adduct hardeners (Col-13, Ln 34-38).

3. Claims 6, 10-11 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Durand et al (US 5,180,523) in view of Omoya et al (US 6,139,777).

The disclosure on the composition of conductive paste by Durand et al as set forth in rejection-1 under 35 USC 102(b) is here incorporated.

The prior art is silent about the disaggregation of the aggregates per claim-6, oxygen content per claim-10, specific resin per claim-11 and the conductive particles comprising alloys per claim-14, and metal/alloy coated conductive or non-conductive core particles per claims 15-16.

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Omoaya et al teach forming low viscosity conductive pastes containing metals such as Ag and Ag-alloys, and Ag or Ag-alloys coated over conductive or non-conductive core particles, wherein the surface oxygen concentration was less than 1.0 wt% and having low resistance. The prior art further teaches using dimer acid glycidyl esters with amine adduct hardeners in the composition to benefit from low viscosity (Col-3, Ln 1-19, Col-11, Ln 30-36; Col-13, Ln 34-38) and making the composition in a three-roll-mill (Abstract, Col-20, Examl-5).

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute mixing of components of Durand with three-roll-mill of Omayaya et al as functional equivalents with reasonable expectation of success because the combined prior art is suggestive of the claimed process, and the claimed disaggregation of the aggregates would be obvious because the composition, components and process of making the art composition (Abstract, Col-20, Examl-5) are similar to that taught by the applicants (Specification: US 2005/0172483; Abstract, Fig-5, Para 0057) and further more both the compositions have same utility as hole-filling pastes.

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute the conductive fillers of Durand with the conductive fillers of Omayaya et al as functional equivalents and/or substitute the resin and hardener of Durand with the dimer acid glycidyl esters and amine adduct hardeners as functional equivalents with reasonable expectation of success to benefit from low viscosity because Durand is concerned about suitable viscosity for screen printing (Col-7, Ln 24-25) and Omoaya et al is suggestive of using the composition by printing methods (Col-1, Ln 45-46) and the combined prior art is suggestive of the claimed composition.

Response to Arguments

Applicants arguments filed 05/24/2006 have been fully considered and they are not persuasive to over come the above rejections/objections.

Applicants argue that the prior art by Durand et al does not teach the claimed volume ratios of components is not persuasive (Response, Pg-7, Ln 14-16; Pg-8, Ln 2-8). The prior art teaches a composition containing 75 wt% conductive Ag particles and 25 wt% epoxy resin (Col-5, Ln 57-59; Col-8,

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Table) that meets the applicant's volumetric ratios of components in the claim, and has been addressed in detail in Rejection-1 under 35 USC 102(b).

Applicants argue that Omayia teaches only one particle diameter in the composition and fails to teach a primary particle size and agglomerate of primary particles (Response, Page-9, Ln 6-11, 16-17). The limitation of claim-1 does not require the presence of two different particles in the composition as argued, and the agglomeration of the particles would be obvious as shown by the micrographs for Cu-powder by Umicore.

For the reasons set forth above, the applicant's composition fail to patentably distinguish over the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMV
August 01, 2006.


DOUGLAS MCGINTY
SUPERVISORY PATENT EXAMINER

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